PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Steel Wool Soap Pad and Method of Making Same

I, CARL J. DEMRICK, a citizen of the United States of America, of 6375 Golfview Drive, Birmingham, Michigan, United States of America, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to soap impregnated scouring pads and to a method of making such pads.

Scouring pads of the type which have a body of fibrous scouring material such as steel wool impregnated with soap have been well known for many years, but they have never proved to be entirely satisfactory for many reasons. Some of the problems of prior scouring pads of this character have arisen because of variations that occur in physical properties of the steel wool used in making such pads. In this respect, it is found that the resilient or fluffy character of steel wool will vary significantly among steel wools of the same commercial grade. These different physical characteristics can even be found in the same continuous ribbon of a large roll of such ribbon, because of changing conditions that may occur during the manufacturing of the ribbon.

Other problems that exist in connection with prior scouring pads have arisen because of the manner in which the soap is introduced into the steel wool during the forming of the pad. Various arrangements are known for introducing soap into the pad, such as dipping the ribbon into a tank of liquid soap, injecting soap into the formed pad by means of a needle, and passing liquid soap through the formed steel wool pad.

In the manufacture of soap impregnated scouring pads efforts have been made to provide scouring pads which have a soap content of a sufficient amount so that soap will remain in the pad during the effective life of the steel wool. However, as indicated above, the scouring pads comprising the prior art have failed to meet these requirements in the optimum manner, because when soap has been applied in the methods heretofore employed in making the pads, either insufficient soap has been applied, or when sufficient soap has been applied, the steel wool has been matted together so as to reduce its effectiveness.

It is an object of the present invention to provide an improved soap impregnated scouring pad which is constructed and arranged so that it reduces or overcomes the disadvantages of prior soap pads.

According to the invention there is provided a scouring pad comprising a body of fibrous scouring material enclosing a firm central core of soap and having additional soap dispersed in the material enclosing the core between the central core and the outer surface of the scouring pad.

The invention also provides a method of making a scouring pad comprising the steps of applying fluid soap on a surface of a ribbon of resilient fibrous scouring material, applying a core of soap on one surface of the ribbon adjacent to one end thereof, winding the ribbon from said one end around the core, and pressing the wound ribbon transversely of the axis of the wound ribbon to define a pad having an at least partially compressed peripheral edge portion and a relatively free and yielding central portion.

The invention will be described, merely by way of example, with reference to the accompanying drawings, wherein:

FIGURE 1 is a schematic diagram illustrating a method of producing a scouring pad embodying the present invention;

FIGURE 2 is an enlarged fragmentary view illustrating a step of spraying soap on

[Price 4s. 6d.]

the ribbon used in manufacturing the scouring pad;

FIGURE 3 is an enlarged fragmentary view illustrating one length of ribbon partially wound during one step in the method of manufacturing the scouring pad;

FIGURE 4 is a modified form of the soap spraying station illustrated in FIG. 2;

FIGURE 5 is a top plan view of a scouring pad embodying the present invention;

FIGURE 6 is a front elevation of the soap pad illustrated in FIG. 5;

FIGURE 7 is a side elevation of the soap pad illustrated in FIG. 5;

FIGURE 8 is a sectional view taken on the line 8-8 of FIG. 5;

FIGURE 9 is a fragmentary sectional view taken on the line 9-9 of FIG. 5; and

FIGURE 10 is an enlarged fragmentary section illustrating in greater detail the dispersion of the soap in the steel wool of the scouring pad.

Attention is now directed to FIGS. 1 to 4 in connection with which the method of manufacturing the scouring pad embodying the present invention will be described in greater detail. As shown in FIG. 1, a relatively large roll of steel wool 10 is positioned for feeding a continuous ribbon 12 of steel wool to the apparatus for forming scouring pads 14.

In a preferred method of forming the scouring pads 14, the ribbon 12 initially has soap 18 sprayed on one of its surfaces by means of a nozzle 16. The ribbon 12 may then be inverted by a guide mechanism 20 so that the one surface of the ribbon on which the soap 18 has been sprayed will be lowermost. The continuous ribbon 12 is then advanced through the station 22 which functions to separate the ribbon 12 into a series of short lengths of ribbon 24. At the illustrated station 22, a first drive gear 26 is arranged to be rotated intermittently in the direction of the indicating arrow and a driven gear 28 is spring mounted thereabove to allow the continuous ribbon 12 to be moved intermittently between gears 26 and 28 and to be advanced onto the stationary plate 30. A second drive gear 32 is positioned to be continuously rotated in the direction of the indicating arrow, and a second driven gear 34 is similarly spring mounted above the drive gear 32 for advancing lengths of ribbon 24.

By virtue of the continuous operation of drive gear 32 and intermittent operation of drive gear 26, lengths of ribbon 24 will be torn from the ends of the continuous ribbon 12 during those intervals of time when the rotation of drive gear 26 is interrupted. Suitable timing means, not shown, can be employed for interrupting rotation of the drive gear 26 at uniform intervals to provide lengths of ribbon 24 of uniform lengths.

Other means may be employed for separating the lengths of ribbon 24 from the continuous ribbon 12, such for example as a cutting knife. However, it is found that more desirable qualities are realized in the scouring pad which is produced when the illustrated tearing step is employed, because this procedure is found to eliminate undesirable tails that might otherwise project from the finished product when means such as a cutting knife are employed.

Operated in timed sequence in relation to the interruption of rotation of the drive gear 26 is a nozzle 36 which is arranged to discharge a gob or core 38 of soap on the upper surface and at the forward end of each advancing length of ribbon 24. Thus, there is shown at the forward end of ribbon 24 a core 38 which has been applied to the upper surface of the ribbon 24 by the nozzle 36.

Located immediately adjacent to the separating station 22 is a winding station 40 which is adapted to receive the length of ribbon 24 on which the core 38 has been applied and to wind the ribbon about the core to produce in sequence a series of fluffy rolls 42 each having a core of soap 38 and radially spaced outwardly therefrom a plurality of layers of steel wool containing the sprayed soap 18.

The winding station 40 comprises a continuous belt 44 which is suitably driven for continuous rotation so as to wind and advance the lengths of ribbon 24 toward the pressing station 46.

The winding operation begins when a flexible vane 48 engages the forward end of the advancing ribbon 24, causing the forward end to roll back upon itself as shown in FIG. 1. As the belt 44 continues to advance the ribbon 24, the upper portion of the latter frictionally engages a stationary guide member 50 causing the advancing length of ribbon to wind upon itself in the illustrated manner. The stationary guide member 50 diverges from the continuous belt 44 so as to accommodate the growth in diameter of the roll 42 and to prevent undesirable compressing of the latter which might destroy some of its fluffy characteristics.

As each roll 42 arrives at the end of the continuous belt 44, it is discharged into a rectangular funnel 52 for guiding it into a circular die 54. Suitable means, not shown, are then employed for triggering a press member 56 so that the latter can descend into the die member 54 to press the roll 42 against the bottom die member 56' transversely of the axis of the roll to form a scouring pad with an at least partially compressed peripheral edge and a central portion which remains relatively free and yielding. As soon as the pressing operation

is completed, the press member 56 is retracted to the illustrated position and the bottom die member 56' is suitably retracted to allow the pressed pad to be discharged through a guide chute 58 onto a continuously driven belt 60 for conveying the finished scouring pads in the direction of the indicating arrow. If desired, the scouring pads 14 may then be conveyed past another spraying station, not shown, where additional soap may be sprayed on the exterior surface of the scouring pad.

It is also contemplated that the inverting station 20 may be eliminated, if desired, and the soap spraying station can be modified by adding a second spray nozzle 16*a* for spraying the underside of the continuous ribbon 12, and it is also contemplated that when using this arrangement, soap may be sprayed only through the spray nozzle 16*a*. It is to be understood that it is normally desired to have the ribbon 12 sprayed in such a manner that when the roll 42 is formed, the outer surface of the roll will have soap sprayed thereon with a maximum permissible concentration. This can be seen in FIG. 3 which illustrates that as the length of ribbon 24 is being wound, the core of soap 38 is located in the centre of the roll and the soap 18 which has been sprayed onto the ribbon has its maximum concentration on the outer surface of each of the windings. It is also contemplated that the spraying station 16 and the tearing station 22 can be reversed in order.

It can also be observed from FIG. 3 that the end of the length of ribbon 24 is frayed as a result of the tearing operation, and it is found that this frayed end when wound around the roll will provide a somewhat cylindrical outer surface to the roll and the individual strands of steel wool in the frayed end will adhere to the surface of the roll so that no undesirable tails are present.

As previously indicated, the physical properties of steel wool vary during its manufacture. This is believed to be the result of various conditions relating to the cutting tools, the cutting temperatures, the physical properties of the wire from which the steel wool is manufactured, and the like. A steel wool having a commercial grade of O is preferred for scouring pads embodying the present invention. This commercial grade can be varied by a half grade, plus or minus. However, even when the commercial grade remains the same the physical properties of the steel wool can vary. Thus, in some instances the wool will have more resilient properties and will be able to retain its fluffy characteristics more readily than other steel wools of the same grade.

It is desired to retain the fluffy or resilient characteristics of the steel wool in the finished scouring pad, and it has been discovered that in order to retain the fluffy characteristics of the scouring pad while still introducing the maximum amount of soap into the pad, it is necessary to vary the proportion of the soap that is applied in the core and the soap that is applied by spraying. Thus, if the steel wool appears to have less resilience or fluffiness, it is found that the steel wool pad can still carry the maximum desired amount of soap, but it is necessary that a heavier concentration of the soap be in the core and a lesser amount be sprayed on the ribbon during the forming operation of the scouring pad.

In normal operations, it is found that a scouring pad having steel wool weighing between five and six grams or 5½ and 6½ grams will produce a very satisfactory pad for domestic uses; the total weight of soap in the pad may then suitably be between 5 and 7½ grams. By selecting the proper ratio of soap in the core and dispersed throughout the steel wool, it is found that pads can be uniformly made wherein the weight of soap will equal or exceed the weight of the steel wool, and such pads will still retain their fluffy characteristics. It is believed readily understood that if excessive amounts of soap are introduced into the steel wool or in any given portion of the steel wool, the adhesive properties of the soap will overcome the resilient characteristics of the steel wool so as to produce a relatively heavily matted pad. A pad of this type is normally undesirable and does not produce the desired scouring action.

It has been discovered that the maximum amount of soap can be introduced into the steel wool when soap is applied to the steel wool in the manner described above, and when the proportions of soap in the core and in the sprayed soap are properly selected in accordance with the fluffy characteristics of the particular steel wool that is being used in manufacturing the scouring pads.

A suitable soap that may be used for these purposes is one which has a melting point at approximately 135°F and which can be applied between the temperatures 135°F to 180°F. Soap of lower melting point may be used, but it is necessary to take particular precautions to store the scouring pads in a location where the temperature will remain below the melting point of the soap. It has also been found that a soap which has 60% dry material may be used in forming the described scouring pads.

When applying the soap through the nozzle 16, a satisfactory procedure has been one in which the soap has been discharged through the nozzle 16 at about 600 pounds per square inch pressure at a distance of approximately three inches above the ribbon 12. The temperature of the soap passing

through the nozzle was approximately 150°F, and the soap was one which had a melting point of 135°F and which contained approximately 60% solid matter. Soap having the same properties was discharged in the soap core 38 form by means of the nozzle 36. Depending upon the characteristics of the steel wool, the amount of wet soap of this concentration which was found satisfactory when applied to a steel wool ribbon weighing six grams was a core having a weight of two grams and a sprayed soap weighing seven grams. It was also found that the ratio of weight of soap could be varied to the extent of using a core weighing four and one-half grams and sprayed soap weighing four and one-half grams. Both of these examples have proved to be very satisfactory and to provide a relatively long life for the pad in which the soap content remains in the steel wool for a substantially longer time of use than with the scouring pads heretofore known. As previously indicated, it is difficult to define the characteristics of steel wool except to examine the same as it is being supplied in continuous ribbon form, and it is necessary for the operator of the apparatus for making the scouring pad to ascertain the extent of the fluffy characteristics of the steel wool as it is being used. When the most optimum resilient fluffy characteristics are present, a higher percentage of soap can be sprayed on the ribbon and when relatively less desirable properties are found in the steel wool, it may be necessary to spray less soap onto the ribbon and apply a higher percentage of soap onto the ribbon as the core element. When a production run using a roll of steel wool is begun, it is necessary for the operator to determine by visual inspection and by feeling the ribbon from roll 10 and the finished pad 14 to determine whether the desired properties are present. If they are not present, it is then necessary for him to vary the ratio of soap between the core soap and the sprayed soap. The ratio of core soap to sprayed soap is preferably in the range between 1 to 1 and 2 to 7. This can readily be accomplished merely by changing the position of the spray nozzle 16 so that the soap is dispersed over a greater area thereby resulting in a smaller concentration of soap being applied to the ribbon. The sprayed soap which does not engage the ribbon can be collected in a receptacle and returned to the heating tank for further use. At the same time the nozzle 36 or the controls therefor must be altered to allow a larger gob or core of soap to be discharged to make up for the reduced soap sprayed onto the ribbon.

Referring now to FIGS. 5 to 10, the finished scouring pad 14 will be described. As thereshown, the scouring pad 14 comprises a body of steel wool having a partially compressed peripheral edge or rim portion 62, and a central portion 64 which is relatively free and yielding. As shown in Figure 5 the rim portion is generally circular in shape in plane view. The steel wool encloses the firm central core of soap 38 and has additional soap 18 dispersed in the wool in a plurality of layers surrounding the central core, the additional soap thus being dispersed in the steel wool between the central core and the outer surface of the pad.

Referring particularly to FIG. 10, which is a magnified enlargement of the outer layers of the pad, it can be seen that the soap 18 is in layers in generally uniform gradients of maximum to minimum concentration with the maximum concentration being outermost. It will be recognized that by virtue of this dispersion, the soap is uniformly distributed throughout the pad in the maximum amount selected without causing undesirable matting of the scouring pad, and an additional core of soap is provided in the centre of the pad so as to ensure that the soap content will be sufficient under normal usage during the effective life of the steel wool.

It is also to be observed that the gradients of soap concentration can be altered merely by using two spray nozzles such as shown for example in FIG. 4.

WHAT I CLAIM IS:—

1. A scouring pad comprising a body of fibrous scouring material enclosing a firm central core of soap and having additional soap dispersed in the material enclosing the core between the outer surface of the pad and the central core.

2. A scouring pad according to claim 1, wherein the additional soap is dispersed in the fibrous scouring material in layers surrounding the central core.

3. A scouring pad according to claim 2, wherein the soap in each layer is generally in uniform gradients of maximum to minimum concentration.

4. A scouring pad according to claim 3, wherein the maximum concentration is outermost, with the layers extending to the outer surface of the body.

5. A scouring pad according to any preceding claim, wherein the body of scouring material has a central portion which is relatively free and yielding and an at least partially compressed peripheral rim portion of generally circular shape.

6. A scouring pad according to any preceding claim, wherein the scouring material comprises a steel wool.

7. A scouring pad according to claim 6, wherein the combined dry weight of the soap in the core and the additional dispersed soap is not less than the weight of the steel wool.

8. A scouring pad according to claim 6,

wherein the steel wool has a weight of between 5½ and 6½ grams and the core of soap and the additional soap has a combined dry weight of between 5 and 7½ grams.

9. A scouring pad according to any preceding claim, wherein the ratio of core soap to additional soap is within the range between 1 to 1 and 2 to 7.

10. A method of making a scouring pad comprising the steps of applying fluid soap on a surface of a ribbon of resilient fibrous scouring material, applying a core of soap on one surface of the ribbon adjacent to one end thereof, winding the ribbon from said one end around the core, and pressing the wound ribbon transversely of the axis of the wound ribbon to define a pad having an at least partially compressed peripheral edge portion and a relatively free and yielding central portion.

11. A method according to claim 10, wherein fluid soap is applied on both surfaces of the ribbon of fibrous scouring material.

12. A method according to claim 10, wherein the fluid soap is applied on one surface of a ribbon of steel wool and the core of soap is applied to the other surface of the ribbon.

13. A method according to claim 12, wherein the ribbon is loosely wound around the core to form a fluffy roll having a core of soap and radially outwardly therefrom a plurality of layers of scouring material with soap applied thereon, the roll being so pressed that the relatively free and yielding central portion contains the core of soap and a plurality of layers of soap surrounding the core.

14. A method according to claim 10, 11, 12 or 13, wherein the fluid soap is sprayed onto a continuous ribbon of steel wool which is separated into lengths of ribbon of approximately equal weight, the core of soap being applied to each length of ribbon adjacent to one end thereof.

15. A method according to claim 14 wherein the lengths of ribbon are separated from the continuous ribbon by a tearing step.

16. A method according to any one of claims 10 to 15, wherein the fluid soap is sprayed onto the ribbon of scouring material so as to disperse soap in the ribbon with the maximum concentration of soap on the sprayed surface of the ribbon.

17. A method according to any one of claims 10 to 16, wherein the fibrous scouring material comprises steel wool.

18. A method according to claim 17, wherein the soap applied to the ribbon surface and the core soap has a total dry weight which is not less than the weight of the ribbon, the amount of fluid soap applied to the ribbon being restricted to an amount which will allow the central portion of the formed pad to be relatively free and yielding.

19. A method according to any one of claims 10 to 18, wherein additional fluid soap is sprayed on the outer surface of the formed pad.

20. A method of making scouring pads substantially as herein described with reference to the accompanying drawings.

21. Scouring pads when made by the method of any one of claims 10 to 20.

22. Scouring pads constructed and arranged substantially as herein described with reference to and as illustrated in Figures 5 to 10 of the accompanying drawings.

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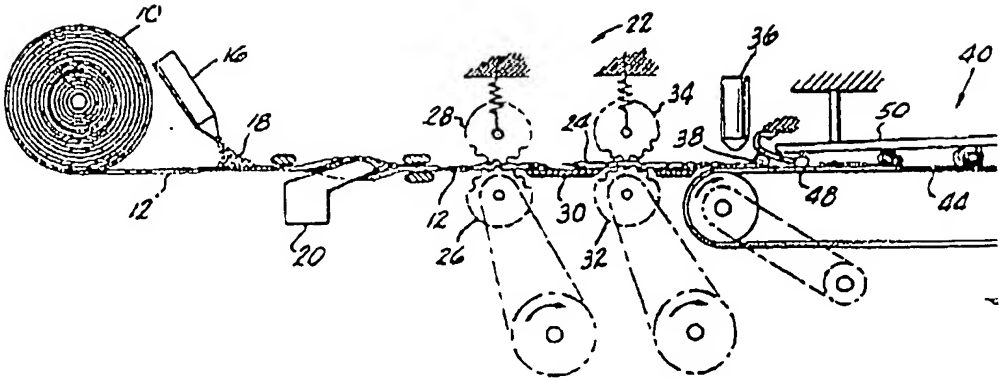
FIG. 1



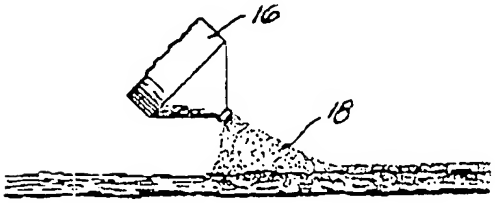


FIG. 2

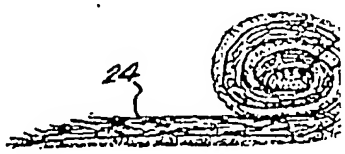


FIG. 3

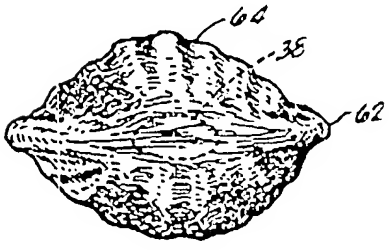


FIG. 7

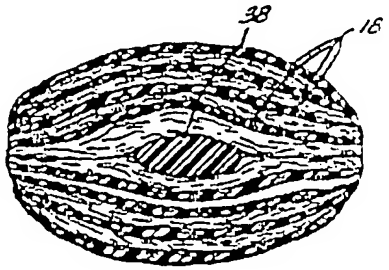


FIG. 8

1,117,722 COMPLETE SPECIFICATION
1 SHEET This drawing is a reproduction of the Original on a reduced scale